AMENDMENTS TO THE CLAIMS

1. (Currently amended) A telecommunications network, comprising:

plural nodes connected by plural spans and arranged to form a mesh network;

at least one pre-configured cycle of spare capacity being established in the mesh network, the pre-configured cycle including plural nodes of the mesh network and being pre-configured prior to any span or node failure; and

the plural nodes of the pre-configured cycle being configured to protect at least one path segment, where the path segment includes at least two intersecting nodes within the pre-configured cycle and at least one intermediate node in a path that includes the two intersecting nodes and straddles the pre-configured cycle, the intermediate node not being a part of the pre-configured cycle and the pre-configured cycle providing two restoration paths to protect against a failure of a span straddling the pre-configured cycle and one restoration path for a failure of a span on the pre-configured cycle.

2. (Original) The telecommunications network of claim 1 in which the path segments are segments of a working path with a start node not connected to the pre-configured cycle.

3. (Original) The telecommunications network of claim 1 in which the path segments are segments of a working path with an end node not connected to the pre-configured cycle.

4. (Original) The telecommunications network of claim 1 in which the pre-configured cycle of spare capacity is provided by:

a) identifying all working flows in the mesh network to be restored;

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b) identifying the spare capacity of the pre-configured cycle to restore all working flows for all spans subject to failure in all path segments;

c) providing spare capacity along the pre-configured cycle sufficient to restore all working flows.

5. (Original) The telecommunications network of claim 1 in which establishing a pre-configured cycle comprises the steps of:

pre-selecting a set of candidate cycles for forming into pre-configured cycles;

allocating working paths and spare capacity in the mesh network based on the set of candidate cycles; and

providing the mesh network with spare capacity arranged in pre-configured cycles according to the allocation determined in the preceding step.

6. (Original) The telecommunications network of claim 5 in which the allocation of working paths and spare capacity is jointly optimized.

7. (Original) The telecommunications network of claim 5 in which pre-selecting candidate cycles includes ranking a set of closed paths in the mesh network according to the degree to which each closed path protects spans on and off the closed path, and selecting candidate cycles from the set of closed paths.

8. (Original) The telecommunications network of claim 7 in which pre-selecting candidate cycles comprises:

a) determining a scoring credit for each closed path in the set of closed paths, where the scoring credit of said closed path is calculated to predict the success of the closed path as a pre-configured cycle; and

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b) choosing a select number of closed paths based on the scoring credit to be the pre-selected candidate cycles.

9. (Original) The telecommunications network of claim 8 in which the scoring credit is calculated by increasing said scoring credit by a value for each flow within said closed path that is protected by said closed path, increasing said scoring credit by a larger value for each flow not on said closed path that is protected by said closed path, weighting the value provided by each flow according to the traffic along said each flow and the length of each flow, and taking the ratio of said scoring credit with the cost of said closed path.

10. (Original) The telecommunications network of claim 5 in which a mixed selection strategy is used for pre-selecting candidate cycles.

11. (Original) The telecommunications network of claim 1 in which establishing the pre-configured cycle comprises recording at a node on a pre-configured cycle an identification of protected flow paths that pass through the node and are protected by the pre-configured cycle.

12. (Original) The telecommunications network of claim 11 in which protecting a path segment comprises, upon failure of a span in a protected flow path, the node, at which the identification of the protected flow paths is recorded, routing the telecommunications traffic along the pre-configured cycle.

13. (Original) The telecommunications network of claim 4 where the path segment is part of a path of an express flow through a network region.

14. (Original) The telecommunications network of claim 4 where the pre-configured cycle is an area boundary flow protecting *p*-cycle.

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15. (Currently amended) A method of operating a telecommunications network, the telecommunications network comprising plural nodes connected by plural spans and arranged to form a mesh network, the method comprising the steps of:

establishing at least one pre-configured cycle of spare capacity in the mesh network, the pre-configured cycle including plural nodes of the mesh network and being pre-configured prior to any span or node failure; and

configuring the plural nodes of the pre-configured cycle to protect at least one path segment, where the path segment includes at least two intersecting nodes within the pre-configured cycle and at least one intermediate node in a path that includes the two intersecting nodes and straddles the pre-configured cycle, the intermediate node not being a part of the pre-configured cycle and the pre-configured cycle providing two restoration paths to protect against a failure of a span straddling the pre-configured cycle and one restoration path for a failure of a span on the pre-configured cycle.

16. (Original) The method of claim 15 in which the path segments are segments of a working path with a start node not connected to the pre-configured cycle.

17. (Original) The method of claim 15 in which the path segments are segments of a working path with an end node not connected to the pre-configured cycle.

18. (Original) The method of claim 15 in which the pre-configured cycle of spare capacity is provided by:

a) identifying all working flows in the mesh network to be restored;

b) identifying the spare capacity of the pre-configured cycle to restore all working flows for all spans subject to failure in all path segments;

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c) providing spare capacity along the pre-configured cycle sufficient to restore all working flows.

19. (Original) The method of claim 15 in which establishing a pre-configured cycle comprises the steps of:

pre-selecting a set of candidate cycles for forming into pre-configured cycles;

allocating working paths and spare capacity in the mesh network based on the set of candidate cycles; and

providing the mesh network with spare capacity arranged in pre-configured cycles according to the allocation determined in the preceding step.

20. (Original) The method of claim 19 in which the allocation of working paths and spare capacity is jointly optimized.

21. (Original) The method of claim 19 in which pre-selecting candidate cycles includes ranking a set of closed paths in the mesh telecommunications network according to the degree to which each closed path protects spans on and off the closed path, and selecting candidate cycles from the set of closed paths.

22. (Original) The method of claim 21 in which pre-selecting candidate cycles comprises:

a) determining a scoring credit for each closed path in the set of closed paths, where the scoring credit of said closed path is calculated to predict the success of the closed path as a pre-configured cycle; and

b) choosing a select number of closed paths based on the scoring credit to be the pre-selected candidate cycles.

23. (Original) The method of claim 22 in which the scoring credit is calculated by increasing said scoring credit by a value for each flow within said closed path that is protected by said closed path, increasing said scoring credit by a larger value for each flow not on said closed path that is protected by said closed path, weighting the value provided by each flow according to the traffic along said each flow and the length of each flow, and taking the ratio of said scoring credit with the cost of said closed path.

24. (Original) The method of claim 19 in which a mixed selection strategy is used for pre-selecting candidate cycles.

25. (Original) The method of claim 15 in which establishing the pre-configured cycle comprises recording at a node on a pre-configured cycle an identification of protected flow paths that pass through the node and are protected by the pre-configured cycle.

26. (Original) The method of claim 25 in which protecting a path segment comprises, upon failure of a span in a protected flow path, the node, at which the identification of the protected flow paths is recorded, routing the telecommunications traffic along the pre-configured cycle..

27. (Original) The method of claim 18 where the path segment is part of a path of an express flow through a network region.

28. (Original) The method of claim 18 where the pre-configured cycle is an area boundary flow protecting *p*-cycle.

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